Federal

Federal Program: ENDANGERED SPECIES-WILDLIFE DIVERSITY
USFWS Region 3 - Section 6 Funds
Illinois Department of Natural Resources - Office of Resource Conservation

GRANT PROPOSAL

Project Title: Mine Stability and Implications For Endangered Bat Conservation.

Principal Investigator: Drs. Timothy C. Carter and George A. Feldhamer
Department of Zoology
Southern Illinois University
Carbondale, IL 62901-6501

Contact Person: Dr. George A. Feldhamer
(618) 453-4115
feldhamer@zoology.siu.edu

Grantee Name: Southern Illinois University/George Feldhamer

Funding Request: $25,219

Duration of Project: This project is scheduled for two years starting in September 2006. Room selection and deployment of temperature loggers and monitoring mats will be done during September 2006. Monitoring of sloughing instability will begin in October 2006. Monthly visits will be made to the mines with fieldwork concluding October 2007. Data entry, analyses and completing final reports will be conducted from November 2007 to September 2008.

A. **Project Justification:** The complex of over 50 abandoned microcrystalline silica mines owned by Unimin Minerals in southern Illinois has become an increasingly important resource for the endangered Indiana bat (*Myotis sodalis*). At least 14 of these mines are large enough to accommodate substantial numbers of hibernating bats. An estimated 52,400 bats (est. in 2005) of 5 different species hibernate within these mines. Indiana bats were first discovered using one of these abandoned mines in 1996. In 2005, an estimated 37,500 Indiana bats used 6 of the abandoned mines within the complex.

Additionally, male Indiana bats use these mines as roost sites during the summer, with an estimated 11,000 individuals in "bachelor colonies" among 6 mines. There has been a dramatic increase in the number of bats using these mines in recent years, as evidenced by yearly surveys of hibernacula. Such increases indicate that these mines are a desirable location for these bats to hibernate. Paradoxically, however, we are unsure if these mines are a safe place for hibernating bats. Like all abandoned mines, there is considerable settling and periodic cave-in or sloughing of material off ceilings and walls throughout these silica mines. While there is no evidence of large numbers of bats being killed by these events, the risk still exists. Unlike coal mines, these silica mines do not harbor toxic or flammable gases. Therefore, only period cave-ins represent a potential danger to hibernating bats. The proposed project will examine mine instability in relation to the potential danger it represents to hibernating bats.

B. **Project Objective:** Our objective is to quantify the extent of instability in abandoned silica mines and the potential danger posed to hibernating bats. Instability – measured as the percentage of material sloughing from ceilings and walls per unit of time – will be determined as a function of the following variables: time of year, mean internal and external temperature, range of internal and external temperature variability, moisture content of silica, and presence of clay seams or other material impurities.

C. **Expected Results and/or Benefits:** In meetings with the U.S. Fish and Wildlife Service, concerns were raised about the stability of these silica mines with regard to the safety of the bats using them as hibernacula. This project is designed to answer those concerns before additional time and resources are expended to enhance and protect hibernacula that may, because of their inherent instability, ultimately further endanger populations.

D. **Project Approach:** Because of the problems associated with disturbance to hibernating or roosting bats, mines with large numbers of Indiana bats (such as Magazine Mine and Mine 30) will be excluded from this study. Instead, we will select 10 mines without large numbers of Indiana bats. Within each of these mines, we will randomly select rooms that are relatively stable, intermediately stable, and unstable. Stable rooms will be

rooms where little or no material has fallen from the ceiling or walls. Often in stable rooms the original tire tracks from the mining equipment can still be seen. Intermediate rooms are those where some material has fallen from the ceiling, but no large areas have collapsed. Generally, the fallen materials on the floor are <30 cm deep and < 9 m^2. Unstable rooms are those where large sections of the ceiling have collapsed and the material on the floor is 30 to 100 cm deep and > 9 m^2.

Stability will be examined in some locations monthly, and in other locations every 3 months. Ten stable, intermediate, and unstable rooms will be monitored each month from September 2006 to September 2007. In addition, 30 stable, intermediate, and unstable rooms (total of 90) will be monitored once every 3 months from September 2006 to September 2007. Within each room, monitoring mats (black plastic sheets 9 m^2) will be placed in 5 locations. One mat will be placed in the center of the room, with the four other mats placed adjacent to the walls in each cardinal direction. During each visit the mats will be checked and photographed for evidence of new material. We also will estimate the total area (ceiling and walls) of each room.

Within each room a temperature data logger will be installed. Data loggers will record the temperature within the room every hour. The data loggers will be downloaded once a year or as needed. Within each room, a sample will be taken of any material that falls on the collecting mats. These samples will be tested for moisture content. Random samples of stable material (that which has not fallen) will be collected and analyzed as well for comparative purposes. Finally, within each room the number and relative size of clay seams and any other evidence of impurities (e.g. color change) in the silica will be noted.

E. Project Location(s): The microcrystalline deposit in which the mines are located is approximately 5 x 10 km in size, and is located in Union and Alexander Counties, Illinois. The mineral rights and therefore access rights are owned by Unimin Minerals. The surface ownership is mostly the U.S. Forest Service and private landowners. Unimin Minerals has granted SIUC unlimited access rights to conduct this study.

Federal

F. Estimated Cost/Budget:

"Mine Stability and Implications For Bat Conservation"

George A. Feldhamer & Timothy C. Carter, Southern Illinois University, Carbondale Illinois

Expenses	**Year 1**	**Year 2**
Labor		
Graduate Student (6 months @ $1256/month)	3,768	3,768
Technician (6 months @ 1000/month)	3,000	3,000
Travel		
Mileage @ $0.405/mile @ 7,000 miles	2,835	2,835
Supplies		
Temperature Data Loggers (140) @ $16	2,240	0
Logger interface and software	100	0
Plastic Sheeting, Stakes	80	0
Digital Camera	400	0
Flashlights, Misc	300	0
Page charges, software etc…	0	600
Year Totals	$12,723	$10.203
2-Year Total		$22,926
Indirect costs (10%)		$2,293
Project Total	**$25,219**	

G. Illinois DNR Personnel: Joseph Kath with the Illinois DNR-Office of Resource Conservation will serve as the state project leaders and will be coordinating with other IDNR employees on this project.

Joseph Kath
Phone: (217)782-6384
E-mail: Joe.Kath@illinois.gov